

Coast to Coast Engineers

the CANNON

January 13, 1981

University of Toronto Engineering Society

Vol. III No. 5

CCES Held at Queen's

More than 140 delegates from twenty-nine Canadian engineering schools gathered in Kingston last week for the thirteenth Congress of Canadian Engineering Students, which ran January 7 to 11. The conference was hosted by the Queen's University Engineering Society.

Almost every Canadian engineering school was represented at the meeting, with students travelling from as far afield as the University of British Columbia and Memorial University of Newfoundland.

The theme of the conference was 'Engineering and Government: The Shaping of Society' and delegates heard a number of presentations and panel discussions by prominent people in industry, education and government. Topics of discussion included Canada's industrial policy, the technology of the CANDU reactor and its significance, and the difficulties of the acid rain controversy. As well, student papers were presented, such as one on the effects of the National Energy Program on Alberta's resource

industry (presented by the University of Alberta), the engineer as a politician (Western), and the importance of the Hibernia oil field (Memorial University).

Delegates visited the construction site of the Pickering B Nuclear Generating Station and the Urban Transportation Development Corporation's design and test facility, located near Kingston, and participated in workshops on small business.

Most delegates expressed a great deal of pleasure with the conference, which was quite well-organised. A great deal of benefit was undoubtedly derived from the opportunities the delegates had to discuss the nature of the operation of their engineering societies. In one session the hope was expressed that future conferences could include specifically scheduled time periods for the purpose of discussing student issues and Society operations. This sort of discussion occurs at many regional conferences, but is much more informal at the national conference.



Donald Montgomery, Secretary and Treasurer of the Canadian Labour Congress presents CCES delegates with his opinion of Canada's industrial policy.

One problem that has plagued CCES for many years is the lack of communication between engineering schools, and the failure of the Congress to enact resolutions after they are made. Several delegates addressed themselves to this concern, and several possible solutions were discussed.

CCES is a corporation with its

head office located in Waterloo. It was generally agreed that a secretary should be appointed at the annual conference to co-ordinate and maintain the corporate and financial records of the CCES. It was hoped that this would improve continuity.

The office in Waterloo is also to serve as a clearing house for information from the various

engineering societies. By improving the communication between societies, by exchanging newspapers and newsletters, it was thought that the Congress might become an ongoing benefit to engineering students, rather than a once yearly meeting.

There was some difficulty in deciding exactly what the nature of the secretarial position should be. While offering a paid position might lead to a long-lasting appointment and therefore improved continuity, it was felt by some that this could lead to an unwanted and burdensome bureaucracy.

At the Plenary session held January 10, it was agreed Waterloo would compile a set of the post-publications from the thirteen conferences held to date and distribute abstracts of these to all the Societies. Sherbrooke, the university that initiated the incorporation of the Congress will henceforth perform the task of ensuring that government corporate laws are met in the keeping of financial records and such.

Next year's conference will be hosted by Waterloo.

This Month

CCES in Kingston

Organising a conference as large as the recent Congress of Canadian Engineering Students meeting at Queen's takes a lot of work. The organisers benefited a lot from the experience, but they're glad it's over page 3

Thick Film Circuits

Integrated circuits can be manufactured in the same manner as a T-shirt design, and tremendous savings of time and money. page 4

Cannonball

The Cannonball semi-formal is a little different this year. Included in the ticket price is a sit-down dinner, a move from Hart House to the Sheraton Centre, and an Eng. Soc. subsidy. page 6

Toike Uncertain

Despite 'uncertainty over the publishing future of the Toike Oike, plans are being made for a meeting between Eng. Soc. officials and a women's group to discuss the publishing practices of the paper.

In the fall, the women approached William Alexander, the University's Vice President - Personnel and Student Affairs, with their complaints. He contacted Dean Gordon Slemon and a meeting of the two groups involved was arranged for December 12. Unfortunately, the Eng. Soc. officials involved were committed to exams and

the meeting was postponed. No new date has been established.

Eng. Soc. President David LeGresley says he is not exactly sure what form the meeting will take. Mr. Alexander and Dean Slemon plan to attend, and LeGresley says he, Toike editor Dave Thompson, and past editor Bob Moul, will likely represent the Society. Moul has been at the centre of a plan to change the paper's style.

Members of the Communications committee have welcomed the chance for discussion that the meeting will provide. It is the first time such a discussion has occurred.

Recent developments, however, might indicate that the meeting will, in fact, be superficial. The Toike Oike published January 9 states that it is 'the very last Toike Oike', and cites 'circumstances beyond our control' as its reason to cease publication. The Toike editor and Communication chairmen refused to elaborate, saying the problem was self-evident. The Toike has recently suffered many staffing problems.

More details are expected to come to light at the end of the month, after the Eng. Soc. Council meeting of January 20.

the CANNON

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The Nature of APEO

Following is the text of remarks by R. M. Dillon, P. Eng., President of the Association of Professional Engineers of Ontario, in a lecture on the role and nature of APEO. The lecture was held in room 116 of the Wallberg Building on November 20, 1980, as one of the Faculty's Engineering Seminars for staff and students.

Thank you for the invitation to speak to you this afternoon. It gives me great pleasure and a feeling of nostalgia as an ex-dean to be back again in an academic environment. Old deans, they say, never die. They just lose their faculties. I lost or gave up mine at Western almost 10 years ago. And now, I'm in government where I have learned that politics are everywhere - in business, in academe, as well as in government. And also that the academic brand is by far the more deadly - since it is less apparent, more subtle, and

machiavellian.

As President Gerald Ford has said, so profoundly, when one is asked to make a speech, the first thing one has to decide is what to say. In my case, you have simplified the choice by asking me to speak on a topic on which I can find a great deal today, namely, the Nature and Role of APEO—The Association of Professional Engineers of Ontario.

It is a subject of vital concern to Engineers and to you who may aspire to engineering. If you intend to practise your profession in Ontario on graduation, you will be required by law to become registered members of APEO. However, because of this requirement, don't assume for one minute that I view you as a captive audience—with no choice in the matter—that willy-nilly, you will have to submit to regulation and discipline by a governing body.

For a number of very good reasons, apart from the legal necessity, membership in the Association is, or should be, a highly desirable, worthwhile and personally rewarding experience. What I want especially, to talk to you about, goes far deeper than APEO's statutory role.

There is much more to being a professional engineer than having passed your exams, styling yourselves "P.Eng.", and receiving the privilege of affixing the official seal of the Association to your drawings and specifications.

What I really want to talk about is the spirit rather than the letter of the law.

Sorry!

It has been brought to our attention that the article "The Old Observatory's Noble History", which appeared in the October 31, 1980 issue of the Cannon, contained illustrations which were not credited. The historical photographs of the observatory were obtained from the University of Toronto Archives, while the photograph of Prof. Dalton and Anne Bobyk appeared courtesy of the newspaper. The Cannon regrets this oversight.

First of all, however, let me give you a brief outline of how and why APEO came into existence, its structure, statutory role and general nature.

APEO came into being with the passage of the first Professional Engineers Act by the Ontario Legislature in 1922. This was a so-called open Act which encouraged those who were qualified to join the Association to be recognized as Members of the Profession and to be granted the right to call themselves Professional Engineers. In 1937 the legislation was amended to make membership mandatory for all those who wished to practice engineering in the province.

In Canada, under the British North American Act, the regulation of the professions comes under provincial jurisdiction and other provinces have engineering associations with self-governing powers similar to ours.

In Ontario and Canada for the most part, the Engineering profession is self-governing - which means that by and large the government contents itself with setting the basic rules through legislation and naming a certain proportion of members to governing Councils. This is a compromise - between the United States system where regulation is carried out directly by State governments - and the United Kingdom where there is no government regulation at all.

The profession in Canada is a great national fraternity within which 100,000 registered engineers practice this profession from Victoria, B.C. to St. John's, Newfoundland. This calls for effective liaison between provincial governing bodies, so engineers who are registered in one province can readily move to and practice in another. Obviously, maintaining uniformity of registration, licensure, professional standards and disciplinary procedures throughout Canada is an important factor in facilitating this mobility.

Fortunately, there is excellent co-operation between the provincial associations under the umbrella of the co-ordinating

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Missing Out

The thirteenth Congress of Canadian Engineering Students was held last week in Kingston. UofT sent four delegates and an observer. The Eng. Soc. paid the delegates fees, accommodation and most meals at the Kingston Holiday Inn, and transportation.

The UofT representatives enjoyed themselves immensely. They heard many interesting speakers, met students from across the country, and traded stories, ideas, and memorabilia. One UofT student was offered \$2.50 for a \$0.50 BFC button!

UofT could have sent more people to the conference. Because it was so close, it was hoped that six or seven students might attend, but no one else expressed an interest in attending.

It strikes me that a lot of students are missing out on these conferences. This was the third conference this year, and

UofT hasn't sent a full delegation to one yet. In fact no one from UofT attended the APEO conference at Guelph. The need for delegates was announced in Council, and presumably in class by the Class reps, but few people came forward.

It's a shame. These affairs provide a wonderful opportunity to learn a lot of interesting things, and meet a lot of people. They are by no means boring. Other schools realise this; UBC sent seven students, the University of Alberta sent six.

Perhaps UofT students think they need some particular qualification to attend a student conference, and that they lack that qualification. Very often, however, all they need to do is express an interest.

The Society tries to ensure that as many people as possible can benefit from attending these student conferences. If you don't take advantage of this opportunity, you're missing out.

Godiva Week

WEDNESDAY
JANUARY 14

CHARIOT RACE

Meet on the front campus at noon to watch the course clubs bottle it out for the Jerry P. Potts Trophy.

THURSDAY
JANUARY 15

SKI DAY

Enjoy a day on the slopes of one of Ontario's finest resorts. Tickets are \$18 at the Stores.

FRIDAY
JANUARY 16

ROAMAROUND

Three bonds,
Three pubs,
\$3.00
Tickets of SAC.

SATURDAY
JANUARY 17

WINTERFEST

Cop off Godiva Week with good times at the U.C. Refectory. Starts at 8:00p.m.

8T1



While in Kingston, CCES delegates visited the Urban Transportation Development Corporation's test site.

Below: The control tower that acts as the nerve centre for the driverless trains.

Bottom left: A UTDC vehicle, designed and built in Canada by Metro Canada, a UTDC subsidiary.

Left: A UTDC project engineer explains the truck mechanism of the vehicle.



A Headache – But Worth It!

As one might guess, co-ordinating a five-day conference involving 140 delegates from across Canada, 22 speakers from industry, academics, and government, two field trips and a number of social events is no easy task.

The thirteenth Congress of Canadian Engineering Students, held January 7 to 11 at Queen's University took over a year to plan, and cost about \$45,000, says Richard Klajnscek, Agenda Director for the conference.

'We started planning in November, 1979, by performing a feasibility study,' Klajnscek explains, 'and when we went to the 1980 conference in Edmonton we were ready to make a well-founded bid for the conference.'

As mentioned, the conference budget was in excess of \$45,000, and while delegates did pay fees, the bulk of the cost was financed through donations from industry, and various universities. Apparently, many of the larger corporations, those from whom large donations were expected, did not come through, and the fund raising turned out to be a very difficult task.

The organising committee was composed of nine Queen's students. An Honorary committee was also formed, including members of the administration of Queen's, the Honourable Flora MacDonald (PC-Kingston and

the Islands), and many high-ranking officials in industry. Klajnscek points out that this committee played a very important role in the organization of the conference. Their contacts were used to develop sources of funding and many of the speakers were arranged through them. Klajnscek also credits them with helping the student organisers in selecting the conference theme and choosing topics for presentation and discussion.

The biggest organisational difficulty was that of securing speakers. Many of the officials that attended the conference are very busy professionals, with constantly changing personal schedules. It was an arduous task to find relevant speakers who were available on the days of the conference, and then keep them available despite their other commitments, Klajnscek says. 'When two speakers, both scheduled for the same day, phoned me to cancel out two weeks ago, I thought we were sunk! You've got to be flexible.'

The student committee handled all the specifics of arranging the conference — services, agenda, finances, public relations, etc. It was a massive task, and one that certainly gave the students tremendous experience in organization. As Klajnscek said, though, 'Now that it's happening, I'm a little sick of it.'

Skule Nite 8T1



Skule Nite 8T1: A Musical-Comedy Revue
FEBRUARY 4—7 8:30 p.m.
Hart House Theatre

Reserved Seat Tickets available at:
 Engineering Stores: 20 St. George St. (978-2916)
 Hart House Theatre Box Office: University of Toronto (978-8668)

Thick Film

A faster, less expensive way to produce quality integrated circuits

by Emil Joannou
Eng. Sci. ST1

Thick Film is a widely used yet little understood method of assembling electronic circuits. Few people, even those in the electronics industry, have even heard of Thick Film. Yet once you know what to look for, you can find Thick Film components all around in jukeboxes, smoke alarms, digital watches, televisions, and stereos. In this article I will try to explain what Thick Film is, how it is made, and what it is used for.

Resistors

Most people are familiar with conventional Printed Circuit Boards (PCBs), which are what you find in a transistor radio. Here you start with a copper-clad fiberglass sheet, and photo-etch away the copper where you don't want it. Copper ribbons are left behind to act as conductors, interconnecting the components which are added later. In Thick Film you start with a blank ceramic substrate and use silk-screening of conductive inks to print the conductors where you want them. This in itself is not a great improvement over conventional PCBs, but the advantage is that, by using resistive inks, one can print resistors just as easily as conductors. One stroke of the squeegee and all the resistors on the board are laid down, whereas each resistor would have to be individually inserted in a conventional PCB.

Components

The substrates are not ordinary clay ceramics, but are made from alumina, often with some magnesium content. They come in two to four inch squares cut to exact sizes, 0.020, 0.025 or 0.040 inches thick. The top surface, on which the circuit is printed, is flat to precise tolerances. Most Thick Film houses find it easier to buy their ceramics rather than manufacture their own.

Inks have to have both the desired electrical properties for use, and the proper viscosity and stickiness for printing. Conductive inks are composed of metal powder suspended in a fluid medium, something like thickened aluminum paint. Silver is the most common metal used, although for high reliability, such as in military application, gold or even platinum inks are used. Resistive inks have a mixture of glass and metal beads, obviously the more glass

the higher the resistance. These inks have a consistency approximating that of toothpaste, and, depending on type and quality, cost anywhere from \$35 to \$2000 per ounce.

The screens used in printing are not silk but are made of stainless steel mesh, or sometimes nylon or polyester. Mesh size varies from 80 to 325 threads per inch. Printing is done on an automatic press that lowers the screen down onto the substrate, drives the squeegee across it and raises the screen again for the operator to insert the next ceramic. All prints are 12 to 17 microns thick.

After each print, the substrates are fired at 850 degrees C for thirty to forty-five minutes. This firing cures the ink, and then the next print can go down over the top of the last. It is possible to build crossovers where one conductor crosses over another without connecting, by printing a patch with an insulating coat of dielectric ink between coats of conductor. Small capacitors (one to ten picoFarads) can be printed the same way. Resistors are always printed last so that they only undergo one firing.

Accuracy

The accuracy on printing and firing resistors is only about twenty per cent. If one desires resistors of a more precise value, the resistors are purposely printed too wide so that after firing they come out ten to fifty per cent low in value. This can be

corrected by removing resistive material until the right resistor value is obtained. With early technology, resistor trimming was done by a human operating a fine-tipped sandblast pencil. The grit for sand trimming is not silica sand, but rather alumina dust, the same composition as the substrates. Alumina has a hardness of nine on the Moh's scale, and makes a most effective blasting grit.

The modern method of resistor trimming uses a computer controlled laser. The YAG (Yttrium - Aluminum - Garnet) laser is pulsed at 15 kHz, and between pulses the computer measures the resistor value to see if another pulse is necessary. Such a machine can trim 3500 resistors an hour at up to 0.1 per cent accuracy, or if less accuracy is needed, up to 100,000 resistors an hour. Such a laser trim system costs about \$200,000.

Hybrid Circuits

After printing, firing, and trimming, capacitors and semiconductors can then be added if need be. This results in a hybrid circuit containing both thick film and conventional components.

Ordinary capacitors can be used but chip capacitors that come in a special leadless package meant for thick film are most often used. Semiconductors can be used in ordinary packaging (e.g. TO-92 plastic case for transistors) or in a special SOT-22 miniature plastic case meant for thick film. These components are attached



by reflow soldering.

In reflow soldering, the pads where components are to be mounted are covered over by silk-screen printing with a special solder-paste containing both solder and flux. The component leads are then stuck in this paste which is gooey and holds them down. The circuits are then passed through a reflow furnace which causes the solder to melt and solder the component lead to the pad. The surface tension of the molten solder will also tend to align the lead in the center of the pad, correcting for any error in positioning the component on the substrate.

For really miniature circuits the thick film houses buy semiconductors in no packaging at all, just the little chip of silicon by itself. These chips are about 0.025 inches square for a transistor. These semiconductor die are epoxied down to the substrate and connections made by 0.001 inch diameter aluminum wire ultrasonically bonded to the die and gold pads printed on the substrate.

Finished circuits are then covered with a plastic cap, or

coated in epoxy, and tested before leaving the plant.

Advantages

The advantages of thick film over other technologies is the ability to produce resistors cheaply in large volume, to good accuracy and good temperature and voltage stability. A thick film designer is not limited to standard resistor values, but can call up any odd value necessary. Thus thick film finds applications in precision active filters.

Thick film also offers the advantages of small size, and therefore outstanding high frequency performance. The ceramic substrate is also a good heat conductor giving thick film good power handling capabilities.

But the largest advantage is low cost. A simple network of 8 resistors may sell for as little as twenty-five cents. A large complex circuit with twenty capacitors, seventy precision resistors and six quad Op Amp ICs may sell for as little as \$40 and be the size of a matchbox.



'Competence and Character'

continued from page 3

national body called the Canadian Council of Professional Engineers.

The Associations in each of the ten Provinces and two Territories have delegated certain of their powers to the C.C.P.E. in order to establish a national voice for Professional Engineering. C.C.P.E. thus represents about 100,000 engineers, 46,000 of whom are registered in Ontario.

In Ontario, the affairs of the Association are administered by a Council of 23 Members. Members are organized within 42 Chapters which are grouped within 7 regions across the Province.

The statutory role of APEO is set out in the Professional Engineers Act. The objects of the Association are defined in the act as follows:

"(a) to regulate the practice of professional engineering and to govern the profession in accordance with this act, the regulations and the by-laws;

(b) to establish and maintain standard of knowledge and skill among its members; and

(c) to establish and maintain standards of professional ethics among its members, in order that"—and this is so vitally important and essential because it is the *raison d'être* for the granting of self-regulating powers—"the public interest may be served and protected."

The Associations Code of

Ethics is most emphatic on this point. It reads, "A professional engineer shall regard his duty to public welfare as paramount."

That is the legal reason why, if you wish to practise as a professional engineer in Ontario, you are required by law to become registered with APEO.

This principle of the paramouncy of the public interest is embodied in the motto in the Association's coat of arms - *servire et defendere*, to serve and defend. Our commitment is to ensure and demonstrate to the public, responsibility, accountability and competence. As I said, it is the reason for our existence.

As a self-governing body, we are not a law unto ourselves. APEO's authority is derived from the people in Ontario through the Legislature and the Council of the Association is responsible to the Government through the Attorney General for carrying out that authority in a responsible way.

This includes disciplining members when necessary. Decisions in disciplinary proceedings represent a judgment by peers of the professional conduct or competence of fellow engineers and are subject to a right of appeal to the courts.

Just this year the Professional Organizations Committee, appointed by Attorney General Roy McMurtry, completed a three-year study of four of the professions in Ontario, including engineering.

In general, its report found the professions remarkably healthy, adaptable, commendably open to criticism and responsive to members and the public. As a result of the committee's recommendations, there will be some changes in legislation governing the professions, but no major changes in self-regulating functions appear to be indicated. In essence, the report gives the professions a clean bill of health.

While it is gratifying for us to have received a generally favourable endorsement of our stewardship, APEO must continue to be an outward-looking organization, with a Council and membership responsive and alive to the ongoing responsibility this stewardship entails.

We take pride in calling ourselves professional engineers, even though the term "professional" is loosely applied. In the same column of the Metro Toronto phone directory in which the short title Professional Engineers of Ontario is listed, these listings also appear: Professional Beauty Treatment Centre, Professional Carpet Cleaning, Professional Smoking-Weight Control Clinics, Professional Negative Services—whatever that means—and a number of other claimants to professional status.

These claims lead to confusion in the public's mind which is not helpful - but there should be no such confusion on our part. To my mind, professionalism for an engineer entails a lasting commitment to the practice of

engineering in the public interest, and in accordance with our code of ethics.

Our Code of Ethics is an obligation which the Professional Engineers Act gives us the authority to establish and the responsibility to maintain. From the code flow the standards of performance binding on our members, and enforced by them, through Council and its Committees.

I don't know whether this will be good news or bad news for engineering students, burdened as you are with examinations, but we are in the process of establishing a mandatory exam in professional practice and ethics. This will be taken after recording as a graduate engineer-in-training and prior to registration as a professional engineer.

This emphasis on professionalism is not new. Indeed, it was one of the main factors leading to the formation of APEO in 1922. The concept is being reinforced for a number of reasons, all of which have their root in the public interest.

The professions today are under the gun, as evidenced by the establishment of the Attorney-General's study committee. The same is true of all institutions, including the universities, that operate in the public realm. They must justify the responsibilities given them by statute to a somewhat distrustful and suspicious public.

Engineers are vulnerable. The public in many ways lacks an understanding of technology, which in turn breeds a fear of technology itself—a fear of the unknown, of forces over which, it seems to them, they have no control. Three Mile Island is fresh in our minds—and there is Acid Rain.

Much of this fear is the result of immoderate and sometimes inaccurate criticism - but we should be honest enough to recognize that we have made mistakes - and to this extent we are responsible. The important thing is that we correct them - to do less would be an abrogation of our responsibility.

If we are to succeed, we must first re-establish a climate of positive public opinion. This will entail engineers being socially responsible and being seen, actively, to demonstrate that concern. If science and technology are to be regarded as constructive and not destructive elements, as uplifting and not dehumanizing, as a practical means of raising the standards of living and improving the lot of people everywhere, then it must present the image of indeed being a force for human betterment.

News about scientific advances and outstanding feats of engineering do not rate among the sexiest stories in the news rooms. Thus, all too often headlines deal with bridges falling in or systems which fail. To be fair to the news media, however, more space and coverage is now being given to science and engineering and the degree of expertise that writers in these fields have acquired is encouraging.

By the same token, we cannot expect others to do all the work for us. Our story must have the ring of credibility to it. Those who work as engineers must do

so in such a way that the public perceives their work to be contributing to the general good. We have to understand what is at the root of public mistrust and suspicion if we are to gain acceptance for what we do.

Our challenge as engineers today and yours tomorrow is to resolve public concern about the social effects of what we do by demonstrating that we do serve the public interest; that the benefits of technology are compatible with the quality of life and the preservation of the environment; that we can have our cake and eat it.

Engineering is a profession which constantly redefines itself as the boundaries of our comprehension expand. From the narrow base of military engineering, engineers have spread, in a remarkably short time, over a wide front to encompass an incredible range of human endeavour. There is a constant blending of common interest in which there is an engineering involvement—not only in chemistry, physics and mathematics, but biology, medicine and increasingly the human and social services. The process continues and today we look beyond the traditional engineering disciplines, though the need for practitioners in these fields will remain. There will then be more emphasis on specialization - and hence greater opportunity for all who can qualify.

I am convinced, however, of the value of a sound grounding in the fundamentals of engineering. The fundamentals found in the undergraduate engineering curriculum provide a most useful base from which to add to one's knowledge. Your course will stand you in good stead whether you practise your profession after graduation or whether you decide to follow other endeavours.

In these few minutes, I hope I have been able to get across something about the spirit and character of the Engineering profession and in so doing have persuaded some of you to take up engineering as a career. I can assure a warm welcome to all of you who can qualify - and that we need you all! The total development of our nation, in social, as well as economic terms, depends on the work of engineers.

In reflection, just think about the work of one of Canada's outstanding engineers James Milton Ham, and ask yourselves this question, does he, as President of the University of Toronto practise his profession?

I suggest he was doing just that when, very recently, he said this: 'Formal education is concerned with the development of competence. But education has also got to be concerned with character and conscience. I think the problems of the Profession are really related to issues not intrinsically of competence but of character, conscience and ethics, and the whole interplay of the Profession with Society. The Profession must exhibit not only competence but competence within the framework of an understanding of Society and its values.'

Thank you.



call for 'Labatt's Blue'

Eng. Soc. News

Sports Review



by June Li
Chem. Eng. 8T2

The Skule sports program is once again in full swing. The fall term was a relatively successful one for Skule teams, with many teams, exhibiting improvements over last year.

The big news in the fall was Skule's last minute 33-30 football victory over St. Mike's for the Mulock Cup. The game-winning touchdown was scored with only eleven seconds remaining. The passing game of Guy Armstrong to Steve Skurnac provided the spark in the final quarter, giving Engineering its first Mulock Cup in twenty-six years. The determination and ability of the entire team deserves to be commended.

The men's swim team was also victorious, the team strength being in the relays. The lacrosse team, division champions last year, moved to a higher division, and with a strong effort, they advanced to the semi-finals but were defeated in overtime. The soccer teams were not as successful but both teams showed a lot of potential and can only im-

prove. Most players will be returning. The coaches hope for a greater turnout from the ranks of 8T4.

Only fourteen people entered in the track and field meet. Engineering did manage to win the top two spots in the shot put. In previous years, Engineering has been one of the best teams, due in part to a strong turnout.

Women's sports had a better than average turnout this fall. For the first time, there was a soccer league this year. Most who came out had never played soccer before, but with coaching and much enthusiasm, the team made it to the semi-finals. It was encouraging that, in the regular season, we had tied the eventual champions.

The basketball team made it to the quarter-finals in the A division, having moved up from the B division where they had been champions for the last two years. The football team put in a good effort. There were almost enough players for two teams.

Team sports had a much greater turnout than the individual sports such as swimming

and track and field. However, women's tennis did have some measure of success, finishing first in their division and second overall.

Co-ed participation has been in the volleyball, basketball, and broomball leagues. Volleyball has ended, basketball is beginning, and broomball continues from the fall. In February, there is a co-ed badminton doubles tournament. Get a team together from your class and enter. Each team consists of three pairs of doubles. The tournament is more recreational than competitive, so all you need is enthusiasm.

Other ongoing sports are men's and women's squash, men's waterpolo and women's innertube waterpolo. Men's basketball continues from the fall, with two teams entered. Volleyball has five teams of various levels entered. Participation in ice hockey is also excellent. There are twenty intramural teams from various classes besides the junior and senior interfaculty teams.

In women's volleyball, which began last week, there were almost enough players for three teams. Skule won the B division title last year. This year, one team is in the A division and another one in B division. There is a calendar of events for women's sports in the Chemical common room and second floor washroom in the Galbraith building. Practice and game times are posted as well as game results.

On Friday, March 13, the S Dance is being held in the Great Hall at Hart House. All engineers, not just those who have participated in Skule sports, are welcome. Admission is free and there will be a live band. Dress is casual but no jeans. There will be a short awards presentation followed by a dance.

Eng. Soc. Announcements

Skule Nite 8T1

Skule Nite 8T1 needs seamstresses and cutters immediately. If interested, call 978-2917. Benefits include invitation to the cast party.

Stores Manager

The Society is in need of a student manager for the Engineering Stores. The position provides excellent experience in the operation of a small business. Submit applications to V.P.-Administration John Byrne.

Business Manager

The Communications Committee seeks business managers for the engineering publications. The position largely involves keeping track of advertising orders and helping the treasurer with the financial records. Leave a message in the Communications mailbox.

Cannonball

by David LeGresley
President

Every spring the Engineering Society holds a semi-formal dance, affectionately known as the Cannonball. Though it is intended to be for all engineering undergraduates, it is specifically tailored to the student in first through third year. The graduating class has their own formal, the Grad Ball.

This year, the Engineering Society Council decided that it was time to alter the format of the Cannonball by moving it from the Great Hall in Hart House to the Sheraton Centre, and including a full sit-down dinner with dancing to follow as usual.

Along with such changes, however, goes an increase in

ticket prices, to slightly over \$40 a couple. Council decided during the summer that this was far in excess of what a thrifty student could afford, and thus the Cannonball 8T1 tickets have been subsidized to the tune of \$10 a couple. Along with this subsidy, the cost of drinks was also reduced! (In other words, we want a good turnout and we're willing to pay for it!)

The Social Committee has gone to great lengths to make the Cannonball 8T1 the best one ever, and at \$30 a couple it is a great deal! Please note that, though the actual date of the Cannonball 8T1 is Saturday January 31, all tickets must be purchased before January 25, to facilitate catering arrangements. Buy your tickets early, and enjoy Cannonball 8T1.



Cannonball

Semi-Formal

Saturday, January 31, 1981

Dining and Dancing

Tickets \$30/couple
at the Engineering Stores

As a software developer at Wang, you not only get plenty of personal freedom and day-to-day responsibility — you also get the chance to design your own future.

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For more information, contact Mary Ann Lyons, Wang Laboratories, Inc., Dept. #000, One Industrial Avenue, Lowell, MA 01851, (617) 459-5000.

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Systems Software Development.

We will be on campus January 30, 1981.

Engineering This Month

If you are organizing an event, or know of one, that would be of specific interest to Eng. Soc. members, please drop a short note about it in the Tiny Toike box in the Society offices or contact Ella at 978-2917. It will be listed here free of charge.

Wednesday, January 14

Chariot Race

Mechanical Engineering and its chariot take the field in defense of the Jerry. P. Potts Trophy as reigning Chariot Race champions. Competitors and spectators gather at noon on the front campus.

Thursday, January 15

Ski Day

Skule has Osler Bluff Ski Resort all to itself for a day of skiing, fun, and prizes. Cross-country is available. Tickets are available in the Stores for \$18, which includes return transportation and lift tickets. Rentals are extra, and should be ordered when tickets are bought.

Friday, January 16

SAC Roamaround

SAC presents a winter version of its fall classic. Hear Michael Jordana, Peter Shields and The Heaters, and The Bopcats as your room from the Great Hall, to Dr. John's, to Med. Sci. Tickets are \$3.00 at SAC.

Saturday, January 17

Winterfest

Skule sponsors a Winterfest Pub! Come out for some good times while you still can. 8:00 p.m. in the U.C. Refectory.

Tuesday, January 20

Council Meeting

Class Eng. Soc. reps and Faculty Council reps are notified of today's Full Council Meeting. Please meet promptly at 5:00 p.m. in GB202.

Thursday, January 22

Women's Dinner

This year's dinner will be at the Town and Country, on Mutual St., at 7:00 p.m. It will be an all-you-can-eat buffet. Tickets are \$10.50, and can be obtained from the Women's

Committee. Listen for announcements in your class.

Monday, January 26 to

Friday, January 30

Blood Donor Clinic

The annual winter clinic will be held this week. You can give blood until 4:00 p.m. daily, until 6:00 p.m., Thursday. Please donate, the situation in Toronto is critical.

Wednesday, January 28

Faculty Council Meeting

All student Faculty Council reps are asked to attend today at 2:00 p.m. in GB202.

Saturday, January 31

Cannonball

Cannonball 8T1, the annual engineering semi-formal, will be held this year at the Sheraton Centre. Tickets include live music and an excellent dinner, and are available for \$30.00 a couple in the Engineering Stores.

Monday, February 2

Engineering Society

Nominations

Nominations for the five elected positions of the 1981-82 Eng. Soc. executive open today. For more information and for nomination forms see Ella in the Eng. Soc. offices.

Tuesday, February 3

Executive Meeting

The Eng. Soc. Executive meets at 5:00 p.m. in Hart House. Please be on time.



Summer Jobs

Ontario Hydro. Third and fourth year students, all disciplines. Application deadline, January 13.

Procter and Gamble Specialties Ltd. Third year Chemical, Civil, Electrical, Eng. Sci., Industrial, and Mechanical. Apply by January 16.

Petrosar. Second and third year

Chemicals, Electricals, and Mechanicals. Jobs in Sarnia. Deadline, January 22.

Asarco Explorations Co. Second and third year Geologicals. Assisting staff geologists with field work. Job locations in Timmins, Red Lake, and Bathurst, N.B. Deadline January 23.

Dow Chemical. Second and

Third year Chemicals, Process engineering, research and development. Application deadline, January 23.

Dome Petroleum Ltd. Various positions in Calgary. Apply by January 30.

Atomic Energy of Canada Ltd. Third or fourth year with honours standing. Whiteshell

Nuclear Research.

Bema Industries Ltd. Geological assistants, for positions in Yukon and B.C. Ask at the summer desk.

Canadian Occidental Petroleum. Geological field assistants. Geologicals, all years. Ask at the summer desk.

The Engineering STORES

Phone 978-2916
HOURS

8:45 a.m.-4:15 p.m.
(plus or minus
ten percent)

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